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Abstract

Consultants are deemed critical to the success of an ERP implementation because of the breadth and complexity of the system, the management of multiple modules, and the one-time nature of the project that limits desire to increase investment in a permanent workforce. However, consultants often fail to effectively coordinate their activities, making integration of the ERP problematic. Coordination across module implementation of the ERP is essential to the overall success. Achievements of consultants are often controlled by organizations though the negotiated contract, but just how do consultants apply controls to meet their obligations and reach an effective level of integration for the system? A qualitative analysis of consultant perspectives on coordination controls will serves as the basis of the study. Grounded theory techniques will be applied to surface appropriate controls applied by consultants. Taiwan ERP consultants serve as the interview cases. We expect that the level of knowledge of the tasks and procedures could be a determinant of the choice of control mechanisms adopted by ERP consultants firms.

Keywords: ERP implementation, External consultants, Coordination, Project control

1 Introduction

Enterprise Resource Planning (ERP) systems are management information systems that integrate all business recording and reporting processes into one single system (Adam and Doherty, 2000). However, due to the integration of multiple business functions, ERP systems are complex, costly, and risky propositions. Some organizations use their own information technology staff for implementation, but many organizations do not have the ability and rely upon external consultants extensively (Ifinedo and Nahar, 2009). Consultants are those hired by the organizations to provide technical and business expertise and reduce internal knowledge burdens while implementing system projects (Thong, 2001). This prominent role of ERP consultants in systems implementation has been highlighted in research (Ko et al., 2005; Ifinedo and Nahar, 2009).

Although the benefits of ERP consultants are clearly documented, studies also indicate the failure of many cases involving ERP consultants. Some of the most common reasons why clients are not satisfied with consultants include: (a) the consultants did not fully understand the client's needs; (b) the consultants provided a prepackaged answer; (c) the consultants failed to tune into the client's culture; and (d) the

consultants did little more than attempt to squeeze more work out of the clients (Mingay and Peattie, 1992; Vosburg and Kumar, 2001; Vlachopoulou and Manthou, 2006; Wenrich and Ahmad, 2009). Essentially, consultants did not act in the best interests of the client's overall business structure, but focused primarily on the implementation of standard solutions for independent modules for which they were responsible. Based upon agency theory, there are expectations that a consultant may not work to the best interests of principals due to differing goals (Eisenhardt, 1989). When goal conflicts exist between agents and principals, control mechanisms must be implemented to improve the outcome of ERP implementation projects (Kirsch et al., 2002). Control refers to attempts to motivate individuals to achieve desired objectives, and it can be exercised in many fashions (Kirsch, 1997). Existing literature suggests that managing consultant-assisted projects requires that both clients and consultants work to ensure achievement of all objectives, those held jointly and separately (Ko et al., 2005). Controls are designed to force practices that lead to success, such as coordination. Coordination refers to independent stakeholders working to achieve agreement on a common definition of what they are building, sharing crucial information, and meshing activities (Kraut and Streeter, 1999). Often, contracts ensure coordination between consultants and clients (Sabherwal, 2003). Unfortunately, the issue of controls to enforce coordination among ERP consultants by the ERP vendors is seldom addressed, regardless the fact that consultants often only focused primarily on the implementation of standard solutions for independent modules for which they were responsible.

This study attempts to close this gap by focusing on the issue of controlling coordination among the ERP consultants in ERP software vendors. More specifically, we examine the coordination control mechanisms implemented among ERP consultants to tie other modules to the success of their own modules. The results of this study should provide suggestions for ERP project managers and client firms to further control their ERP consultants. In the following sections, we first provide a review of the ERP, agency theory, and control theory literature in the implementation project domain. Then, we advance to describe the research methodology. We conclude with expected contributions of this study.

2 Background

ERP systems allow people across departments in an organization to share and update the information as necessary. Integration across functional boundaries of the organization is one of the touted benefits of ERP systems. Typically, ERP implementation is managed as multiple, interdependent modules (Swanson and Ramiller, 2004; Maheshwari et al., 2006). For example, Ribbers and Schoo (2002) and Davenport (2000) point out that a large and complex ERP implementation project should be managed with three common features among the independent ERP modules: (a) a common objective; (b) coordination needs; and (c) benefit realization as a whole (Prieto, 2008). Managing the interdependencies among modules can reduce rework and optimize the overall ERP performance (Lycett et al., 2004); however, it also requires a great deal of coordination. For example, the material management module is highly related to the production planning module and the sales and distribution module is tightly related to the financial accounting module. Because of interdependence among modules each with its own consultant, coordination is a critical management responsibility. Success of achieving ERP business objectives depends on the degree of integration among each of these modules (Davenport, 2000; Mandal and Gunasekaran, 2003). In fact, studies report that ERP project failures of achieving business objectives are attributed to lack of communication and coordination among individual modules and underestimation of ERP implementation complexity (Ribbers and Schoo, 2002; Boonstra, 2006).

Organizations must rely on external consultants from ERP vendors for ERP implementation projects. Studies document the engagement of external expertise as a prominent factor in ERP implementation success (Ko et al., 2005; Wang et al., 2008). These studies conclude that competent consultants play a significant role for determining ERP implementation success. The consultants provide technical and

business expertise, reduce the learning burden of clients (Thong, 2001), configure appropriate ERP systems, and train users to fully exploit the technology (Wang et al., 2006).

2.1 Agency Theory

Agency theory has been used to understand failures in IS projects and to suggest improvements to practices in those areas. It explains problems that occur when one party (a principal) hires another party (an agent) to perform work on the principal's behalf (Baiman, 1982). A problem – referred to as the agency problem – arises when the agent does not work entirely on the principal's behalf. As a result, the work of the agent will conclude less successfully than it otherwise would. In matrix organizations, the principal is often represented by two stakeholders in IS projects, the functional managers and the program manager. An agency problem exists when an ERP consultant works in his/her own self interests instead of the best interests of the functional managers, ERP program managers, or the firm. ERP implementation projects are considered successful when they are completed on time, within budget, with the desired functionality, and are high in technical quality. Projects that do not meet one or more of these criteria are thought of as less successful. From the perspective of the ERP consultants, a project (i.e., a particular ERP module) may be successful if the consultants were able to overcome some technical limitations of their particular modules or if they learned from the experience, regardless of the project managers concerns with schedule, budget, or the overall level of ERP system quality, especially on the other modules with which they are not involved (Linberg, 1999). Therefore, agency theory suggests that the more the principal relies on the agent for success, the more the principal needs to monitor the performance of the agent. Greater monitoring/management interventions are presumed to produce better expected outcomes (Might and Fischer, 1985).

2.2 Control Mechanism

The term organizational control is often defined as the process of influencing the behavior of group members (Arrow, 1985). It involves a set of mechanisms designed to increase the probability that people will behave in ways that lead to the attainment of organizational objectives. A control system is goal-oriented. Its ultimate intent is not to control the behavior of people in predefined ways, but to influence them to make decisions and take actions that are likely to be consistent with organizational goals. Ideally, the objective of the control system is to promote an identity between the goals of organizational members (e.g., consultants) and the organization as a whole. Ouchi's control theory (1979), which is derived from agency theory, could provide a useful theoretical foundation for conceptualizing the control mechanisms implemented in ERP programs. The notion of control is based on the premise that the controller (the principal) and controlee (the agent) have divergent interests, which control mechanisms attempt to align. We use the term controller to refer to the client department, ERP program manager, or organization responsible for the implementing controls, and controlee to refer to individual ERP consultants in the vendor organization responsible for different ERP module implementation (Tiwana and Keil, 2010).

Control theories suggest that controllers utilize behavior and outcome controls, two modes of formal control (Tiwana and Keil, 2010; Eisenhardt, 1985). Clan control and self-control represent two modes of informal control (Manz et al., 1987; Ouchi, 1980). Under behavioral control, controllers explicitly define the procedures that are to be followed for completing tasks and evaluate controlees' performance by comparing actions taken to the prescribed procedures. Outcome control defines desired task outputs with appropriate targets. Controlees determine how to best meet those targets. Informal controls are social, focusing on individual or group norms and values (Covaleski et al., 1998). A clan is a group where individuals depend on each other and share the same goals. Unlike behavior and outcome controls, there is no explicit incentive to align goals because the clan has the same set of goals or values. Self-control is when an individual sets his own goals, monitors his goal achievement, and rewards or sanctions himself

according to perceptions of having met the goal. Controllers cannot self –control others, but can encourage others to exercise self-control by structuring a work environment that rewards autonomy.

Prior IS studies on control mechanisms in IS development and implementation projects focused projects internally staffed (Kirsch, 1996, 1997). Recent studies, with the popularity of outsourcing IS projects, have begun to directly contrast how controllers attempt to control internal projects with outsourced projects (Tiwana and Keil, 2010). Hazards that control attempts to mitigate were found to be less pronounced in internal projects relative to outsourced projects. Furthermore, behavioral observability, outcome measurability, and controllers' knowledge of the IS development/implementation process were key antecedents for the choice of control mechanisms. In general, organizations often adopted clan and self-management controls (informal controls) and behavior control for the internal IS projects; on the other hand, outcome control mechanisms were most found on the outsourced projects – even though outcome control may not actually indeed enhance the project performance (Tiwana and Keil, 2010). However, an ERP implementation project, with consultants in charge of modules, is often neither fully internal nor outsourced projects. Certain outcome controls are established by the organization, but none have examined the controls consultants place to ensure integration of the system.

3 Methodology

The objectives of this research are to explore the potential agency problem of organizations using ERP consultants and understand what control structures are in place to maximize the probability of ERP consultants being motivated to achieve ERP implementation goals of the organization. In order to achieve this objective, a multiple case study is the selected research strategy. Such an approach is chosen rather than a single case because of significant advantages to develop propositions (Holland and Light, 1999, Strauss and Corbin, 1990, Yin, 1994). Cases were selected from different consultancies in order to look at multiple contexts. A multiple case study explores phenomena in their natural setting. Such a method is appropriate where "the boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used" (Benbasat et al., 1987). Deriving propositions and concepts from the data is a multi-step process outlined in Table 1 (Pandit, 1996). These nine steps of grounded theory building were followed.

Phase 1: Research Design		
Steps	**Activity**	**Current study**
1. Review of technical literature	(1)Definition of research question (2)Definition of a priori constructs or frameworks	(1) The extent of consultants cooperate with other consultants who are responsible for other ERP modules when they designed their proposed solutions?" and "The mechanisms used by the clients to promote cooperation among consultants. (2) Control system (Tiwana and Keil, 2010)
2. Selecting cases	(1)Theoretical, not random, sampling	(1) ERP consultants must have implemented over 5 projects. (2) ERP in global standard package vs. local developed ERP package
Phase 2: data collection		
3. Developing rigorous data collection protocol	(1)Create case study database (2)Employ multiple data collection methods	(1)The taped interviews are transcribed verbatim into documents and the each document is versified by interviewee to increase reliability and constructive validity. (2)Interview and observation to strengthen grounding of theory. (3)Synergistic view of evidence.

	(3)Qualitative and quantitative data	
4. Entering the field	(1)Overlap data collection and analysis (2)Flexible and opportunistic data collection methods	(1)Speeds analysis and reveals helpful adjustments to data collection. (2)Allows investigators to take advantage of emergent themes and unique case features.
Phase 3: Data Ordering		
5. Data ordering	(1)Arraying events chronologically	(1)Facilitates easier data analysis and examination of processes.
Phase 4: Data Analysis Phase		
6. Analyzing data relating to the first case	(1)Use open coding (2)Use axial coding (3)Use selective coding	(1)Identify the control mechanism for the communication and coordination among different modules. (2)Develop connections between control mechanism and communication and coordination (or ERP performance). (3)Integrate categories to build theoretical propositions. (4)All forms of coding enhance internal validity.
7. Theoretical sampling	(1)Literal and theoretical replication across cases (go to step 2 until theoretical saturation)	(1)Confirms, extends and sharpens theoretical framework and propositions.
8. Reaching closure	(1)Theoretical saturation when possible	(1)Ends process when marginal improvement becomes small.
Phase 5: Literature Comparison Phase		
9. Compare emergent theory with extant literature	(1) Comparisons with conflicting frameworks (2) Comparison with similar frameworks	(1)Improve propositions and internal validity (2)Improves external validity by establishing the domain of control mechanism ERP consultants to which the study's finding can be generalized.

Table 1. The Steps to Develop Research Framework (Adapted from Pandit, 1996)

Cases were selected according to the principle of theoretical sampling. Unlike the sampling done in quantitative investigations, theoretical sampling cannot be planned before embarking on a grounded theory study (Strauss and Corbin, 1990). The specific sampling decisions evolve during the research process itself. During initial data collection, when the main categories are emerging, 'deep' coverage of the data is necessary. Subsequently, theoretical sampling requires only collecting data for the development of properties and propositions. The criterion for judging when to stop theoretical sampling is the category's 'theoretical saturation' (Glaser and Strauss, 1967). Our selection criterion for this study's cases is an ERP consultant with at least 5 projects completed. Consultants were chosen that specialize in two different ERP products, one domestic and one foreign to Taiwan. The selection criterion conforms to the principle of theoretical sampling for variation of attribution (Strauss and Corbin, 1990).

The primary data sources will be semi-structured interviews (Myers, 1997). The interview teams will be consisted of two authors of this manuscript. Interview protocols will be developed and refined several times. The interviews will be taped, with agreement from participants. The semi-structured interviews will be lasted on about 1 hour. The taped interviews will be transcribed verbatim into text files. At this stage, the interview questions are divided into four parts: (1) key input factors for designing an individual ERP module; (2) cooperation among ERP consultants responsible for different ERP modules; (3) ERP consultant performance evaluation criteria and ERP implementation objectives; and (4) standard procedures for ERP consultants implementing an ERP module. The following represent a sample of the questions that will guide the interview process:

1. What are the key input factors for designing an individual ERP module?
2. How much "cooperation" exists among consultants working on different modules?

3. What are the main organizational objectives for an ERP implementation?
4. What are the success criteria for evaluating an individual ERP consultant's performance?
5. Are there any rewards for an individual ERP consultant for successful ERP implementation?
6. Are there any rules, procedures, or standard practices that ERP consultants are required to follow when implementing a particular ERP module?
7. Are there any feedback mechanisms to assess an individual consultant's performance?

4 Expected Contributions

The existing literature focuses on the examination of control mechanisms in "internal" IS development projects, though recent studies have attempted to contrast the difference between internal and outsourced IS development projects. This study, on the other hand, attempts to explore the consultant-assisted IS implementation projects with the focus on the control mechanisms adopted by ERP vendors for ensuring coordination among ERP consultants working on different modules. It provides a unique content to examine what control mechanisms were implemented by ERP vendors to enhance the coordination among ERP consultants responsible for different modules.

There is much research of control mechanisms on internal IS development and implementation projects in the existing literature, but few studies have a focus on consultant-assisted projects. A different portfolio of control mechanisms may be adopted for consultant-assisted ERP implementation projects than for internal IS projects. Whereas ERP consultants play significant roles in ERP implementation programs, an understanding of control mechanisms needed for ensuring coordination among ERP consultants will be helpful to management.

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